

IN THE CLAIMS

1. (Currently amended) A storage device,
comprising:

~~plural~~ first, second and third storage volumes
for storing data;

a virtual storage volume which is virtually
possessed by the storage device; and

a control unit, wherein

the control unit includes:

means for receiving, from an information
processing unit, a request for update of the data as the
data exists at a prescribed point in time, the updated data
to be stored in ~~[[a]]~~ the first of the storage volumes
volume after the prescribed point in time;

means for storing a duplicate of the data as the
data exists at the prescribed point in time before the
update, ~~requested to be updated~~ onto ~~[[a]]~~ the second of
the storage volumes volume; ~~[[and]]~~

means for storing, in an unused storage area of
~~[[a]]~~ the third of the storage volumes volume, a duplicate
of the data as the data exists at the prescribed point in
time before the update, ~~requested to be updated according
to a state of~~ in response to a determination that the
second storage volume has a predetermined state; and

a memory control unit which manages or controls a correspondence between the first, second and third storage volumes and the virtual storage volume, wherein the memory control unit includes information concerning to which one of the first, second and third storage volumes an access is to be made in response to a data I/O request from the information processing unit by reference to the correspondence.

2. (Currently amended) The storage device according to Claim 1, wherein:

~~the means for storing onto an unused storage area of the third storage volume the duplicate of the data at the prescribed point in time requested to be updated according to a state of the second storage volume is:~~

~~means for storing~~ the predetermined state of the second storage volume, at which the duplicate of the data at the prescribed point in time requested to be updated is stored onto ~~[[an]]~~ the unused storage area of the third storage volume, exists when a storage capacity of the unused storage area of the second storage volume is smaller than a judgment value.

3. (Original) The storage device according to Claim 2, further comprising:

means for showing a storage capacity of the unused storage area of the second storage volume on a user interface.

4. (Currently amended) The storage device according to Claim 2, further comprising:

means for showing a warning on a user interface ~~according~~ relating to a storage capacity of the unused storage area of the second storage volume.

5. (Currently amended) The storage device according to Claim 1, further comprising:

means for selecting the third storage volume ~~according~~ in response to information[[,]] which is input through a user interface to designate the third storage volume.

6. (Currently amended) The storage device according to Claim 1, further comprising:

means for selecting the third storage volume ~~according~~ in response to a determination that a storage

capacity of an unused storage area of the individual storage volumes possessed by the storage device having a predetermined value.

7. (Currently amended) The storage device according to Claim 1, wherein:

the means for storing in the second storage volume the duplicate of the data at the prescribed point in time ~~requested to be updated~~ are includes:

means for dividing a portion of the storage area, onto which the duplicate of the data is stored, among the storage areas of the second storage volume into sections for storing the data; and

means for writing the duplicate of the data onto a portion of the storage area divided into the sections.

8. (Currently amended) The storage device according to Claim 1, wherein:

the means for storing onto the unused storage area of the third storage volume the duplicate of the data at the prescribed point in time ~~requested to be updated according to a state of the second storage volume~~ are includes:

means for dividing into sections for storing the

data a portion of the unused storage area, onto which the duplicate of the data is stored, in the unused storage areas of the third storage volume; and

means for writing the duplicate of the data onto a portion of the unused storage area which is divided into the sections.

9. (Currently amended) A method of controlling a storage device provided with ~~plural~~ first, second, and third storage volumes for storing data, comprising:

receiving, from an information processing unit, a request for update of the data as the data exists at a prescribed point in time, the updated data to be stored in ~~[[a]]~~ the first of the storage volumes volume after the prescribed point in time;

storing a duplicate of the data as the data exists at the prescribed point in time ~~requested to be updated before the update,~~ onto ~~[[a]]~~ the second of the storage volumes volume; ~~[[and]]~~

storing the duplicate of the data as the data exists at the prescribed point in time ~~requested to be updated before the update,~~ onto an unused storage area of

~~[[a]] the third of the storage volumes according to a state of volume in response to a determination that the second storage volume has a predetermined state;~~

managing or controlling a correspondence between the first, second, and third storage volumes and a virtual storage volume which is virtually possessed by the storage device; and

controlling to which one of the first, second, and third storage volumes an access is to be made in response to a data I/O request from the information processing unit by reference to the correspondence.

10. (Currently amended) The method of controlling a storage device according to Claim 9, wherein:

~~the step of storing the duplicate of the data at the prescribed point in time requested to be updated onto the unused storage area of the third storage volume according to the state of the second storage volume is:~~

~~a step of storing the predetermined state of the second storage volume, at which the duplicate of the data at the prescribed point in time requested to be updated is stored~~ onto the unused storage area of the third storage

volume, exists when a storage capacity of the unused storage area of the second storage volume is smaller than a judgment value.

11. (Original) The method of controlling a storage device according to Claim 10, further comprising:

showing the storage capacity of the unused storage area of the second storage volume on a user interface.

12. (Currently amended) The method of controlling a storage device according to Claim 10, further comprising:

showing a warning on the user interface ~~according~~ relating to the storage capacity of the unused storage area of the second storage volume.

13. (Currently amended) The method of controlling a storage device according to Claim 9, further comprising:

selecting the third storage volume ~~according~~ in response to information[[,]] which is input through the user interface to designate the third storage volume.

14. (Currently amended) The method of controlling a storage device according to Claim 9, further comprising:

selecting the third storage volume ~~according in~~ response to a predetermination that a storage capacity of an unused storage area of the individual storage volumes possessed by the storage device having a predetermined value.

15. (Currently amended) The method of controlling a storage device according to Claim 9, wherein:

the step of ~~recording~~ storing the duplicate of the data at the prescribed point in time ~~requested to be updated~~ onto the second storage volume comprises:

dividing a portion of the storage area, onto which the duplicate of the data is stored, among the storage areas of the second storage volume into sections for storing the data; and

writing the duplicate of the data onto a portion of the storage area divided into the sections.

16. (Currently amended) The method of controlling a storage device according to Claim 9, wherein:

the step of storing the duplicate of the data at

the prescribed point in time ~~requested to be updated~~
~~according to a state of the second storage volume onto an~~
~~unused storage area of the third storage volume~~ comprises:

a step of dividing into sections for storing the data a portion of the unused storage area, onto which the duplicate of the data is stored, in the unused storage area of the third storage volume; and

a step of writing the duplicate of the data onto a portion of the unused storage area which is divided into the sections.

17. (New) The storage device according to Claim 2, wherein the control unit further includes a volume management unit which has information of a storage capacity of the unused storage area of each of the first, second and third storage volumes.

18. (New) The storage device according to Claim 2, wherein the control unit further includes a volume management unit which has information indicating whether each of the first, second and third storage volumes is used as a volume for storing the duplicate of the data at the prescribed point in time before the update in a snapshot control, a volume allowed to store the duplicate of the

data or a spare volume, or has information indicating whether the spare volume is allowed to store data.

19. (New) The storage device according to Claim 1, wherein each of the means for storing stores the duplicate of the data at the prescribed point in time before the update onto a storage area having a low data access performance in the unused storage area of the second or third storage volume, respectively.

20. (New) The storage device according to Claim 1, wherein each of the means for storing stores data used by the information processing unit to provide information processing services onto a storage area having a high data access performance in the unused storage area of the second or third storage volume, respectively.

21. (New) The storage device according to Claim 2, wherein the control unit further includes means for formatting the first, second and third storage volumes by a first format mode or a second format mode, wherein the first format mode is arranged not to accept a data I/O request to the storage volume being formatted during the formatting, while the second format mode is arranged to

U.S. Serial No. 10/658,395

500.43123X00

accept a data I/O request to the storage volume being formatted even during the formatting.